VERIFICATION OF TRANSLATION

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hereby declare that I am the translator of the documents attached and certify that the following is a true translation to the best of my knowledge and belief.

Signature of translator .....

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MOBILE NETWORK SYSTEM FOR TEMPORARY CONNECTION TO A FIXED INFORMATION SYSTEM

The invention relates to a mobile network system for temporary connection to a fixed information system.

The increase in the number of services available using computer systems permanently connected to a fixed information system has recently highlighted the need to provide such services on an occasional, regular or event-related basis in situations where there is no ready access to a remote information system, either public or private.

This type of need has emerged in particular in the tertiary business sector, such as the banking sector, insurance industry and retailing, where it is necessary to provide services on the move or directed at customers away from home, and where these services must be identical to those available from the unit of a centralised service provider via a network and a fixed information system. The mobile network system (SMR) used for temporary connections has therefore proved to be a practical solution in meeting this occasional, regular or event-related need for connection, where a number of participants need to exchange business information with other fixed information systems.

At present, needs of this type are being only partially met.

A first solution is known as the mobile office. This solution allows a personal computer or a mobile terminal provided with telecommunication functions, such as data

transmission and faxing, to receive and send corresponding information or data to another terminal or network via a radio link.

The hardware configuration of the mobile office, for example, requires a personal computer fitted with a PCMCIA port and a modem card of the PCMCIA type II format, connected to a mobile terminal. This configuration offers its user mobility but does not under any circumstances allow a diversity of multi-user access for a given access point. In other words, a configuration of this type enables access to at most one fixed network.

A second solution consists in establishing a fixed connection between a local network and the remote information system. In such a case, this connection is made via public or private fixed networks, such as the data transmission networks, the integrated services digital networks (RNIS/ISDN), the switched telephone networks (RTC/STN), for example or via specialised links (SL/LS).

This type of remote connection of a local network is made via fixed networks and does not therefore offer users any mobility.

The objective of this invention is to overcome the disadvantages of known solutions with a view to providing a solution for extending the information system to mobile applications.

In effect, the invention relates to operation of a mobile network system, referred to hereafter as a mobile network system, for temporary connection to a fixed information system.

Another specific objective of this invention is to

operate a mobile network system of a modular nature, it being possible to connect or disconnect this mobile network system to or from any fixed computer network or alternatively to displace it within the latter, disconnect or displace it within a fixed telecommunications network.

Another objective of this invention is to operate a mode of connecting a mobile network system to a fixed information system to provide an integrated solution in terms of network management and administration, from the point of view of the network manager, and in terms of use, in which the environment of the end user of the mobile network system proposed by the invention is identical to that of the user of a local network connected via fixed networks of the private business network type.

Another objective of this invention is to operate a mobile network system having a greater degree of flexibility for adaptation, due firstly to the use of a radio transmission support enabling the service of the mobile network system to be provided rapidly in non-urban locations, and, secondly, extending the diversity of on-board equipment constituting this mobile network system.

The mobile network system for temporary connection to a fixed information system provided with physical access points, proposed by the invention, is remarkable in that this mobile network system comprises at least one on-board network system having a router to manage a local network, to which at least one server and at least one work station are connected, provided with peripherals to enable information messages to be created, sent, received

and read, and a radio communication system enabling the on-board network system to be connected to at least one physical access point to the information system and enabling these information messages to be exchanged between the on-board network system and the fixed information system.

The mobile network system proposed by the invention finds applications as an extension to any type of fixed computer network, regardless of the protocol used by the latter to transmit data.

Generally speaking, the mobile network system proposed by the invention enables a user to exchange data from said mobile network system, in real time, with the information system of the service which this user normally accesses.

It will be more readily understood from the following description of examples, given by way of illustration only, in conjunction with the appended drawings, in which:

- figure 1 is a synoptic diagram of a mobile network system proposed by the invention and the link between the latter and a fixed information system via a transport network consisting of a public or private analogue (STN) or digital (ISDN) telecommunication or data transmission (X25, ATM, IP, ...) network or alternatively specialised links on the one hand and via an access network consisting of a radio channel communication system on the other;

- figure 2a is a first embodiment of the mobile network system proposed by the invention in which the radio channel communication system constituting said

radio channel access network is a radio access system of the cordless type conforming to the DECT standard of the ETSI;

- figure 2b is a second although not restrictive embodiment of the mobile network system proposed by the invention, in which the radio channel access network is a cellular radio communication network of any type: *"second generation"* (for example of the IS-95, PDC, GSM type) or *"third generation"* (IMT-2000 standard of the ITU or UMTS of the ETSI;

- figure 3a illustrates a third but not restrictive embodiment of the mobile network system proposed by the invention, in which the radio channel access network is of the satellite or satellite network type;

- figure 3b illustrates a third embodiment of the mobile network system proposed by the invention but where a mobile satellite terminal is used.

A more detailed description of a mobile network system for temporary connection to a fixed information system, as proposed by the invention, will now be given with reference to figure 1.

As illustrated in this drawing, the fixed information system, denoted by SI, is an information system supported, for example, by a local business network. Secondly, the support network of the information system is provided with physical access points, denoted by AP in figure 1, these physical access points enabling the fixed information system SI to be accessed from a transport network.

In particular, the on-board network system 1, as illustrated in figure 1, incorporates a router 10

managing a local network to which at least one server, shown by reference 11, is connected, and one or more work stations, shown by references 12-13, connected to peripheral elements to enable information messages to be created, sent, received and read.

The modes by which the mobile network system proposed by the invention accesses the fixed information system SI by radio channel are independent of the internal architecture of the on-board network, which may comprise one or more work stations and one or more servers connected to the router.

In one particularly advantageous embodiment, although this is not restrictive, the local network managed by the router 10 may be a network of the *ETHERNET* type, given the inherent flexibility offered by this type of network.

Furthermore, as also illustrated in figure 1, the mobile network system proposed by the invention has a mobile subscriber station 2 enabling two-way communications so that this on-board network system 1 can be inter-connected to at least one physical access point AP of the local business network supporting the information system SI, by means of which information messages can be exchanged between the on-board network system 1 and the fixed information system SI, via the radio channel access network, RADIO ACCESS NETWORK, and the transport network.

Generally speaking, the access network constituted by this radio channel communication system may be configured to operate with different techniques, in particular based on separate radio technologies, such as

cordless radio access systems of the PHS, PACS or DECT type, cellular radio communication networks of the IS-95, GSM / DCS, PCS, IMT-2000 or UMTS type for example, or alternatively via a satellite or a satellite network, as will be described farther on in the description.

The criteria governing the choice between said different operating solutions are based on considerations relating to coverage of these communication systems by radio link, service quality, cost and the degree of mobility required, degree of mobility being defined as mobility during displacement when information messages may be exchanged as the mobile network system proposed by the invention is being displaced or, in a situation of discrete mobility, where this same exchange of messages does not take place until said mobile network system is at a standstill.

A first embodiment of a mobile network system proposed by the invention will now be described with reference to figure 2a, where the radio channel communication system 2 is a DECT access network.

In this drawing, the server 11 and the work station 12 may be inter-connected to the router 10 via a circuit 10a of the hub type, in a conventional manner. It will also be recalled that the server 11 may be integrated in one of the work stations, although this option is not restrictive.

Furthermore, as illustrated in the same figure 2a, the DECT radio access network has at least one data transmission port 20, at the level of the mobile network system, to which the router 10 is connected, and a subscriber radio module, referred to as MRA, shown by

reference 21, providing an interface between the data transmission port 20 and the DECT radio access network. The subscriber radio module 21 is provided with an antenna to enable DECT signals to be transmitted and received.

In a practical manner, the data transmission port 20 may be a data port of the V.24 type, for example, in which case the subscriber radio module MRA 21 will comply with the requirements of the DECT standard.

The DECT radio access network additionally has a plurality of fixed radio terminals, denoted by BR_1 to BR_3 in figure 2a, although this is not restrictive, to provide an interface between the subscriber radio module 21 and a transport network. Each terminal BR_1 to BR_3 is connected to at least one switch C linked to a main exchange CR of the transport network, as illustrated in figure 2a.

In the embodiment illustrated in figure 2a, the fixed transport network is a public or private analogue or digital (for example STN or ISDN) telecommunications network which has at least one main exchange CR to which are connected each of the concentrators of the DECT access network, a data transmission network or a network of specialised links providing the link to the fixed information system SI of each said central system.

With regard to the specifications of the DECT radio access network, the technology used is a cordless technology currently used in multiple applications: wireless telephony, cordless PABX for applications requiring mobility in a business environment, wireless systems in the local loop known as WILL and applications

of the CTM type for applications requiring mobility in a public environment. Assuming that DECT technology is used for the SMR, different operating modes will be used depending on coverage requirements. By way of example, a system of the WILL type will be more interesting in terms of infrastructure costs, particularly if the connections are systematically initiated by the SMR (no location functions necessary); optionally, it will be able to handle mobility within a same central system. A CTL system, on the other hand, is capable of managing the mobility function between different concentrators, by means of location mechanisms of the intelligent network in the fixed transport network, and will therefore be better suited to connections established indifferently by the information system SI or the on-board network. In any event, all of these systems are particularly well suited to applications of the on-board local *ETHERNET* type, characterised by a discrete mobility requirement, in which the communications essentially take place when the mobile network system is at a standstill or if the latter is being displaced at a limited speed, limited to the speed of a pedestrian for example.

If using a radio access network of the DECT type such as illustrated in figure 2a, the latter, by reference to the ETSI DECT standard, will in fact be made up of:

- a concentrator to handle concentration and traffic switching functions within the DECT access network as well as the radio resource allocation function between the different communications. This central system also manages mobility between the different radio terminals,

such as the terminals BR_1 to BR_3 connected to it. Each concentrator is illustrated in figure 2a and connected to the main exchange mentioned earlier;

- said radio terminals, configured to connect the subscriber radio modules 21 via the DECT interface;

- said MRA 21, effectively providing the interface between the serial port 20 to which the router 10 is connected and the DECT radio interface.

In the embodiment illustrated in figure 2a, a WILL system is used. The connection established between the mobile network system SMR and the fixed information system SI is totally digital in this case, provided the transport network is also digital.

Using a DECT radio access network as in the first embodiment illustrated in figure 2a will mean, in accordance with the currently accepted ETSI standard:

- mobility limited to the coverage zone of one or more DECT radio access networks;

- from a hardware point of view, an analogue connection of the on-board system, in particular the MRA router, to the connection of a LAN or an analogue modem, enabling access to the remote information system SI conventionally connected to the transport network. The router 10 of the on-board network system 1 therefore manages the call processing functions and data transmission to the information system SI.

Generally speaking, the DECT radio access network supplies only this access network to the exclusion of a global network infrastructure. Consequently, if the application requires connections to the SMR initiated by the SI, the addressing and location mechanisms of the

mobile network system SMR must be adapted. Advantageously, if it is desirable to make use of the mobile network system SMR transparent to the user, it will be necessary to assign a single directory number to the SMR from which it can be called. This single number is then processed transparently by a single and unique DECT radio access network. If the mobile network system SMR is displaced between clusters of disjointed DECT radio terminals, location will be managed by the fixed transport network on the basis of specific mechanisms such as call diversion or alternatively by the private company network by means of a specific process enabling the dialled directory number to be identified depending on the effective position of the mobile network system SMR.

Finally, introducing a DECT radio link into the transmission chain will lead to delays due to the radio link. Accordingly, it will be necessary to make allowance for these delays when configuring the settings of the router 10 of the mobile network system SMR.

A more detailed description of a second embodiment of the mobile network system proposed by the invention will now be given with reference to figure 2b.

Advantageously, in said second embodiment, the radio access network is a system of the cellular radio communication type, in particular but not exclusively, a network of the GSM type, since the mobile network system proposed by the invention may be operated on all types of second generation cellular radio communication systems such as GSM/DCS, PCS or IS-95, or third generation such as IMT-2000, UMTS.

However, it should be pointed out that the extended network infrastructure of the GSM network and the management and mobility functions available in said GSM network make it a particularly suitable structure for operating the mobile network system proposed by the invention in terms of terrestrial application, for which connection is possible with mobility at any speed at which the portable device of the mobile network system is displaced.

In the second embodiment of the mobile network system proposed by the invention, such as illustrated in figure 2b, there will be, as illustrated in said drawing, an on-board network system 1 which, in the same way as illustrated in figure 2a, comprises a router 10 to which a server 11 and several work stations 12, 13 are connected, for example, by means of a circuit 10a of the hub type. Clearly, the on-board network system 1 fulfils the same function as that of the first embodiment illustrated in figure 2a, in which the radio access network is a DECT network.

More specifically, the mobile network system has an inter-connection system consisting of a cellular modem, shown by reference 20_1, connected to the router 10, and a cellular mobile terminal, shown by reference 20_2, connected to the modem 20_1.

In the embodiment illustrated in figure 2b, the radio channel network access is a GSM cellular radio communication access system, although this is not restrictive, providing the interface between the mobile terminal 20_2 and a transport network consisting, for example, of the ISDN integrated services digital network

providing the link to the fixed information system. The GSM network supporting this embodiment conforms to the requirements of the ETSI GSM standard.

The mobile network system SMR proposed by the invention, illustrated in a second embodiment in figure 2b, uses the data transmission support service of the GSM standard.

The GSM radio communication network offers two types of inter-connection to the fixed network (the transport network in this description) via analogue modems or via ISDN adapters. Accordingly, depending on how the router of the local fixed network is connected to the STN or ISDN network, one or other of these two transmission modes will be used. However, the UDI inter-connection mode is recommended in order to take advantage of the end to end digital transmission mode for the transmission chain.

Furthermore, the GSM radio communication service is capable of handling two data transmission modes: a mode without error correction and at constant flow rate, referred to as *transparent mode* and a mode with error correction at variable flow rate, known as *non transparent mode*. In either case, these two transmission modes may be used to provide the link for a mobile network system SMR proposed by the invention to a fixed information system SI. However, it should be pointed out that the non transparent mode enables a zero or close to zero residual error rate to be maintained. In practice, the choice of transmission mode will depend on the application used, according to whether this application is more sensitive to delays than errors or vice versa.

Additionally, the router 10 on the one hand hosts an on-board local network 1 and on the other provides an interfacing function between said on-board local network, for example of the *ETHERNET* type, and the external environment.

The cellular modem 20_1 connected to the router may then be provided on a GSM card adapted to the PCMCIA format.

In operating mode, the router 10 controls the cellular modem 20_1 to enable a connection to be established or released and transmit data. For this reason, the router 10, although this is not restrictive, has a set of commands, known as HAYES commands, complemented by settings or commands specific to the GSM environment, defined in the ETSI GSM specifications.

The mobile network system SMR proposed by the invention can be connected to the router of the main fixed network by establishing a connection of the PPP type, for example, the PPP protocol enabling packets in IP format to be transported between the mobile network system SMR and the fixed local network supporting the information system SI illustrated in figure 2b via the transport network.

In terms of application, two work stations, one of them located at the level of the mobile network system SMR proposed by the invention and the other located at the level of the fixed remote local network of the information system, may communicate end to end, depending on the application, on the basis of a connection of the TCP or UDP type, these types of connection in effect enabling data to be transmitted in two directions

simultaneously. The application data will relate to the services offered by the service provider, i.e. banking services, various exchanges of information or other services.

Management of connections of the PPP and TCP type will depend on the specific features and constraints of GSM transmission. A choice based on PPP and TCP parameters will make allowance for these specific features, particularly with regard to the delays introduced by the radio link, this choice of parameters thereby enabling the quality of the service rendered to be improved.

Finally, as with the previously described embodiment, the transport network providing the inter-connection between the radio channel access network and the fixed network, for example a company network, supporting the fixed information system SI, will consist, for example, of an analogue STN or digital ISDN type of telecommunication network, or a data transmission network or alternatively a network of specialised links LS.

A more detailed description will now be given of a third embodiment of the mobile network system SMR proposed by the invention with reference to figures 3a and 3b, where the radio channel communication system is provided in the form of a satellite or satellite network link.

In this embodiment, as illustrated in figures 3a and 3b in particular, the mobile network system SMR has, as with the first and second embodiments, an on-board network system 1 incorporating a router 10, at least one server 11 and at least one work station 12.

In said figure 3b, the server 11 is illustrated as one which is integrated in the work station 12, although this is not restrictive, so as not to overload the drawing. Other local network configurations managed by the router 10 are, of course, also conceivable.

The mobile network system SMR proposed by the invention additionally has a mobile satellite terminal shown by reference 20_3 in figure 3b, connected to the router 10. In said figure 3b, an aerial or antenna is connected to the mobile satellite terminal 20_3.

As illustrated more schematically in figure 3a, said antenna is directed towards one or more satellites providing the satellite link to an earth transmitter/receiver station belonging to said satellite system, in turn connected to the fixed information system SI by means of a transport network, for example the switched telephone network STN or the ISDN integrated services network or any data transmission network or alternatively a specialised links network.

In the embodiments illustrated in figures 3a and 3b, the link between the mobile network system SMR proposed by the invention and the earth station via the satellite (or satellites) is designed as an air interface. This type of interface will not be described in detail since it corresponds to a known type of data transmission system. The earth transmitter/receiver station and the satellite(s) constitute the radio channel access network of this third embodiment.

In one particular embodiment, the mobile satellite terminal 20_3 as illustrated in figure 3b corresponds, although this is not restrictive, to a mobile satellite

terminal or station, *INMARSAT-PHONE*. However, other mobile satellite terminals or other satellite systems other than that of *INMARSAT* would be conceivable, of the geo-stationary type or not.

More specifically, in accordance with the embodiment illustrated in figure 3b, the mobile network system SMR comprises an inter-connection system via radio channel having a mobile satellite terminal *INMARSAT-PHONE* connected to the router and providing the inter-connection with the satellite.

The mobile network system SMR and the remote router managing the fixed local network supporting the information system SI communicate by establishing a connection of said PPP type, for example.

Mobility of the mobile satellite terminal is managed by the satellite system, generally at the level of earth stations of the satellite system, thus enabling the communication to be established between the earth station and the mobile satellite terminal, it being possible to connect said earth station to the fixed local network supporting the information system via a transport network, such as a switched analogue or digital telecommunications network, a specialised links network, a data transmission network or a proprietary network.

Similarly to the first and second embodiments in which the radio channel communication system is handled via a DECT radio access or GSM network respectively, introducing a satellite link into the transmission chain between the mobile network system SMR proposed by the invention will mean that delays will occur in establishing the connection and when transmitting

information between the SMR and the SI, for which allowance will have to be made when entering the settings of the on-board router 10 for managing the on-board local network and the remote router of the fixed local network supporting said information system SI.

Moreover, most satellite link systems have an encryption option which can be used directly by said mobile satellite terminal. This being the case, the mobile network system SMR proposed by the invention therefore has the added option of encrypting information on the link thus established if transmission is in end to end digital mode, for example using the UDI inter-connection mode mentioned earlier in the description.

Finally, for certain satellite configurations, it may be conceivable to locate the information system SI of the private company network in the earth station, which, in certain applications, will advantageously shorten the transmission chain between the mobile network system and the information system.

Advantageously, it would be conceivable to operate the mobile network system SMR by combining two of the operating modes described above - and even three modes - provided the router of the SMR has the requisite output ports.

A glossary is given below, listing all the acronyms and abbreviations used in this field of technology, the asterisks indicating the corresponding English expression.

GLOSSARY

OSI*	Open Systems Interconnection
DECT*	Digital Enhanced Cordless Telecommunication
PACS*	Personal Access Communication System
PHS*	Personal Handy System
PCS*	Personal Communication System
GSM*	Global System for Mobile Communications
DCS*	Digital Communication System
CTM*	Cordless Terminal Mobility
RBL/WILL*	Wireless in the Local Loop (system)
RTC/STN*	Switched Telephone Network
RNIS/ISDN*	Integrated Services Digital Network
PABX*	Private Automatic Branch Exchange
LS/LS*	Specialised links
ATM*	Asynchronous Transmission Mode
MRA/SRM*	Subscriber Radio Module
IP*	Internet Protocol
TCP*	Transmission Control Protocol
PAP*	Password Authentication Protocol
PPP*	Point to Point Protocol
CHAP*	Challenge Authentication Protocol
IMT-2000*	International Mobile Telecommunication-2000
UMTS*	Universal Mobile Telecommunication Services
UIT/ITU*	International Telecommunications Union
ETSI*	European Telecommunications Standard Institute
IS-95*	Interim Standard - 95

	LAN*	Local Area Network
	PDC*	Personal Digital Cellular
	PCMCIA*	Personal Computer Memory Card International Association
5	UDI*	Unrestricted Digital Information
	UDP*	User Datagram Protocol.